

10/530340

JC13 Rec'd PCT/PTO 01 APR 2005

Sequence Listing
SEQUENCE LISTING

<110> THE GOVERNMENT OF THE UNITED STATES OF AMERICA AS
REPRESENTED BY THE SECRETARY OF THE DEPARTMENT OF HEALTH AND
HUMAN SERVICES
Tsai, Robert Y.L.
McKay, Ronald D.G.

<120> METHODS FOR CONTROLLING PROLIFERATION OF CELLS

<130> 4239-66642

<150> PCT/US03/31321

<151> 2003-10-01

<150> 60/442,005

<151> 2003-01-22

<150> 60/415,867

<151> 2002-10-02

<160> 14

<170> PatentIn version 3.2

<210> 1

<211> 1810

<212> DNA

<213> Rattus rattus

<220>

<221> misc_feature

<222> (1705)..(1705)

<223> n is a, c, g, or t

<400> 1

gcggccgagg tacctgagac ctcttctgct ccagacgcgt ccgcggccag gatgaagagg 60

ccgaagttaa agaaagcaag taaacgtatg acctgtatac agcggtataa aatccagaaa 120

aagggttcgag aacatcatcg aaaattaagg aaggaagcta aaaagcgggg tcacaagaag 180

cctaagaagg acccaggagt tccaaatagt gctccctta aagaggctct tc当地cgaa 240

gctgagctaa ggaaacagca gcttgaagaa ctaaaacagc agcagaaact tgacaggcaa 300

aaagaacaag aacgaaaaag aaaacttcaa attagccctg atgatgagca atctaatttg 360

gaaactcagg aggaatctga tgagccccaa ataaagaaa ctaaatcagg caaacagaat 420

ccaaagaagt tacattgtca ggaacttaaa aaggtgattt aagcctcaga cattgtgtta 480

gaagttttgg atgccagaga tcctcttgggt tgcaggtgtc ctcaagtata agaagctgtt 540

atccaaagt gatgtaaaaa actagtactt gtattaaata agtcagatct agtaccaaaa 600

gagaatcttag agaactggct aacttacttg aataaggaat tgccaacagt ggtgttcaaa 660

gcctcaacaa acttaaagaa cagaaagaag acattcaaga taaagaagaa agttgttcca 720

ttccaaagta aactctgctg tggcaaggaa gcactgtgga agtccttgg aggtttcag 780

Sequence Listing

cagtccctgtg	gaaaaggagt	tcaggttgga	gtggttgggtt	tcccaaatgt	gggaaaaagc	840
agcatcatta	atagttaaa	acaagaaagg	atttgcagtg	ttggagtttc	catgggactt	900
acaaggagta	tgcagattgt	cccttagac	aaacagatca	caatcataga	tagtccgtgc	960
ttcattatct	caccttgtaa	ctccccctgct	gcacttgccc	tccgaagtcc	agcaagtatt	1020
gaagttctaa	gaccattgga	ggctgccagt	gccatcctgt	ctcaggctga	tagtcaacag	1080
gtggtgttaa	aataactgt	cccggggtat	aaggattctc	tggatttttt	tactaaactt	1140
gctcagagaa	gaggtctgca	ccaaaaaggt	ggaagccaa	atgtcgaaag	tgctgctaag	1200
ctgctatggt	ctgagtggac	aggtgcctca	ttaggttact	actgccatcc	ccctgcattcc	1260
tggaaatcatt	ctcctcattt	taatgagaat	attacagcaa	tcatgaagag	gggctttaat	1320
ctagaagaac	tagaaaagaa	taatgcacac	agcatacaag	tcctcaaggg	ccctcattta	1380
actaataaaaa	tcctttccg	gtctcgggc	ctgacaaatg	gaatactaga	agaaaaggac	1440
atccccgaag	agtcacccaa	acagacagaa	gaccaacagg	atggtgatga	tcaagaacat	1500
gttactggtg	aaaaaaaaatgc	agagatctca	gatgtgactc	ctgtagaaga	gaccagggag	1560
atgtcacctg	ggcaatcaac	agcaagtaaa	ccatctgaca	gatcctttat	cttggataaa	1620
atgagtgaag	aagacgatgc	ctatgacttt	accacagatt	atatatagcc	ttctaaatgt	1680
tcaagtgtgc	tctgtacagt	gtttntagat	tgctttggta	tgtataaaag	tgtaaatctt	1740
gtgaatatgt	atcatgtttt	aaataaaaaa	caaaataaaa	agtgtttgta	aaaaaaaaaa	1800
aaaaaaaaaa						1810

<210> 2

<211> 538

<212> PRT

<213> Rattus rattus

<400> 2

Met Lys Arg Pro Lys Leu Lys Lys Ala Ser Lys Arg Met Thr Cys His
1 5 10 15

Lys Arg Tyr Lys Ile Gln Lys Lys Val Arg Glu His His Arg Lys Leu
20 25 30

Arg Lys Glu Ala Lys Lys Arg Gly His Lys Lys Pro Lys Lys Asp Pro
35 40 45

Gly Val Pro Asn Ser Ala Pro Phe Lys Glu Ala Leu Leu Arg Glu Ala
50 55 60

Glu Leu Arg Lys Gln Gln Leu Glu Glu Leu Lys Gln Gln Gln Lys Leu
65 70 75 80

Sequence Listing

Asp Arg Gln Lys Glu Gln Glu Arg Lys Arg Lys Leu Glu Ile Ser Pro
85 90 95

Asp Asp Glu Gln Ser Asn Val Glu Thr Gln Glu Glu Ser Asp Glu Pro
100 105 110

Lys Ile Lys Lys Ala Lys Ser Gly Lys Gln Asn Pro Lys Lys Leu His
115 120 125

Cys Gln Glu Leu Lys Lys Val Ile Glu Ala Ser Asp Ile Val Leu Glu
130 135 140

Val Leu Asp Ala Arg Asp Pro Leu Gly Cys Arg Cys Pro Gln Val Glu
145 150 155 160

Glu Ala Val Ile Gln Ser Gly Cys Lys Lys Leu Val Leu Val Leu Asn
165 170 175

Lys Ser Asp Leu Val Pro Lys Glu Asn Leu Glu Asn Trp Leu Thr Tyr
180 185 190

Leu Asn Lys Glu Leu Pro Thr Val Val Phe Lys Ala Ser Thr Asn Leu
195 200 205

Lys Asn Arg Lys Lys Thr Phe Lys Ile Lys Lys Lys Val Val Pro Phe
210 215 220

Gln Ser Lys Leu Cys Cys Gly Lys Glu Ala Leu Trp Lys Leu Leu Gly
225 230 235 240

Gly Phe Gln Gln Ser Cys Gly Lys Gly Val Gln Val Gly Val Val Gly
245 250 255

Phe Pro Asn Val Gly Lys Ser Ser Ile Ile Asn Ser Leu Lys Gln Glu
260 265 270

Arg Ile Cys Ser Val Gly Val Ser Met Gly Leu Thr Arg Ser Met Gln
275 280 285

Ile Val Pro Leu Asp Lys Gln Ile Thr Ile Ile Asp Ser Pro Cys Phe
290 295 300

Ile Ile Ser Pro Cys Asn Ser Pro Ala Ala Leu Ala Leu Arg Ser Pro
305 310 315 320

Ala Ser Ile Glu Val Leu Arg Pro Leu Glu Ala Ala Ser Ala Ile Leu
325 330 335

Sequence Listing

Ser Gln Ala Asp Ser Gln Gln Val Val Leu Lys Tyr Thr Val Pro Gly
340 345 350

Tyr Lys Asp Ser Leu Asp Phe Phe Thr Lys Leu Ala Gln Arg Arg Gly
355 360 365

Leu His Gln Lys Gly Gly Ser Pro Asn Val Glu Ser Ala Ala Lys Leu
370 375 380

Leu Trp Ser Glu Trp Thr Gly Ala Ser Leu Gly Tyr Tyr Cys His Pro
385 390 395 400

Pro Ala Ser Trp Asn His Ser Pro His Phe Asn Glu Asn Ile Thr Ala
405 410 415

Ile Met Lys Arg Gly Phe Asn Leu Glu Glu Leu Glu Lys Asn Asn Ala
420 425 430

His Ser Ile Gln Val Leu Lys Gly Pro His Leu Thr Asn Lys Ile Leu
435 440 445

Phe Arg Ser Ser Gly Leu Thr Asn Gly Ile Leu Glu Glu Lys Asp Ile
450 455 460

Pro Glu Glu Ser Pro Lys Gln Thr Glu Asp Gln Gln Asp Gly Asp Asp
465 470 475 480

Gln Glu His Val Thr Gly Glu Lys Asn Ala Glu Ile Ser Asp Val Thr
485 490 495

Pro Val Glu Glu Thr Arg Glu Met Ser Pro Gly Gln Ser Thr Ala Ser
500 505 510

Lys Pro Ser Asp Arg Ser Phe Ile Leu Asp Lys Met Ser Glu Glu Asp
515 520 525

Asp Ala Tyr Asp Phe Thr Thr Asp Tyr Ile
530 535

<210> 3
<211> 1770

<212> DNA

<213> Mus musculus

<400> 3
gaattcggca cgagggttga accgcagttc cagttcgcac gtggcgcccg agaagtctgtg 60

gtgatcccga gacctcctct gtcctgaag cgtccgcggc caggatgaag aggcctaagt 120
Page 4

Sequence Listing

taaagaaagc gagtaaacgt atgacctgcc ataagcgata taaaattcaa aaaaaggccc	180
gagaacatca tcgaaaatta aggaaggaag ctaaaaaacg gggtcacaag aagcctagga	240
aggaccagg tgttccaaat agtgccctt ttaaagaggc tcttcttcgt gaagctgaac	300
taaggaaaca gcagcttcaa gaactaaaac agcagcagaa acttgatagg caaaaagagc	360
aagaaaggaa aagaaaactt gaagttagcc ctgggtatga gcagtctaattt gtggaaacta	420
gggaggaatc tgacgagccc aaaagaaaga aagccaaagc aggcaaacag aatccaaaga	480
agttacattt ccaggaactt aaaaagggtga ttgaagcctc agacatttg tttagaagttt	540
tggatgccag agatcctt gggtgcaggt gtcctcagat agaagaagct gttatccaga	600
gtgggagtaa gaagctgata cttgtattaa ataagtctga tcttagtacca aaggagaatt	660
tggagaactg gctaaattat ttgaataaag aattgccaac cgtgggttca aaagcctcaa	720
caaacttaaa gaacagaaag acattcaaga taaaaaagaa gaaagttgtt ccattccaaa	780
gcaaaatctg ctgtggcaag gaagcccttt ggaagcttct tggagatttt cagcagtcct	840
gtggaaagga tattcaagtt ggagtgtattt gtttccaaaa tgtggggaaa agcagtgtca	900
ttaatagctt aaaacaagaa tggatttgca atgttggat ttccatggga cttacaagga	960
gcatgcagat tgtccctta gacaagcaga tcacaatcat agacagtcca tgcctaatta	1020
tctcaccttta taactcccccc actgcacttgc cccttcggag tccagcaagc attgaggaac	1080
taagaccgct ggaggctgcc agtgcatttc tgtctcaggc tgataatgaa caggtggtgt	1140
taaaatatac tgtccctgag tataaggatt ctctgcattt ttttactaaa cttgctcaaa	1200
gaagaggtct gcaccaaaaa ggtggaagcc caaatgtgaa aagtgtgt aagctgggt	1260
ggctgtgatg gacaggtgcc tcattaggtt actattgcca tccccctgca tcctggaaatc	1320
attctctgca ttttatgag aatattgcag cagtcatgaa gaaggccttt aatctagaag	1380
aactagaaaa gaataatgca cacagcatac aagtcctcaa gggccctcat ttaactaata	1440
gaatcctttt tcggcttcg ggcctgacaa atggaataact agacgagaag gacatagtcg	1500
aagagaccag ggagctgtca cctgagcaat caacagcagg taagccatct gacgggtcgt	1560
ctgccttggaa tagagcgagt caagaggatg aaacctatga cttcaccaca gattatatat	1620
aaccgccaca cactaacgtg ctctctgtac gctgtgtatg ttagtgtatg atataaaactg	1680
tacatcttgtt aatatgtat catgttataa attcaaaata aaatacaagt atttgcttgc	1740
aaaaaaaaaaaa aaaaaaaaaact cgactctaga	1770

<210> 4
<211> 538
<212> PRT
<213> Mus musculus

Sequence Listing

<400> 4

Met Lys Arg Pro Lys Leu Lys Lys Ala Ser Lys Arg Met Thr Cys His
1 5 10 15

Lys Arg Tyr Lys Ile Gln Lys Lys Val Arg Glu His His Arg Lys Leu
20 25 30

Arg Lys Glu Ala Lys Lys Arg Gly His Lys Lys Pro Arg Lys Asp Pro
35 40 45

Gly Val Pro Asn Ser Ala Pro Phe Lys Glu Ala Leu Leu Arg Glu Ala
50 55 60

Glu Leu Arg Lys Gln Gln Leu Glu Glu Leu Lys Gln Gln Gln Lys Leu
65 70 75 80

Asp Arg Gln Lys Glu Gln Glu Arg Lys Arg Lys Leu Glu Val Ser Pro
85 90 95

Gly Asp Glu Gln Ser Asn Val Glu Thr Arg Glu Glu Ser Asp Glu Pro
100 105 110

Lys Arg Lys Lys Ala Lys Ala Gly Lys Gln Asn Pro Lys Lys Leu His
115 120 125

Cys Gln Glu Leu Lys Lys Val Ile Glu Ala Ser Asp Ile Val Leu Glu
130 135 140

Val Leu Asp Ala Arg Asp Pro Leu Gly Cys Arg Cys Pro Gln Ile Glu
145 150 155 160

Glu Ala Val Ile Gln Ser Gly Ser Lys Lys Leu Ile Leu Val Leu Asn
165 170 175

Lys Ser Asp Leu Val Pro Lys Glu Asn Leu Glu Asn Trp Leu Asn Tyr
180 185 190

Leu Asn Lys Glu Leu Pro Thr Val Val Phe Lys Ala Ser Thr Asn Leu
195 200 205

Lys Asn Arg Lys Thr Phe Lys Ile Lys Lys Lys Val Val Pro Phe
210 215 220

Gln Ser Lys Ile Cys Cys Gly Lys Glu Ala Leu Trp Lys Leu Leu Gly
225 230 235 240

Asp Phe Gln Gln Ser Cys Gly Lys Asp Ile Gln Val Gly Val Ile Gly
Page 6

Phe Pro Asn Val Gly Lys Ser Ser Val Ile Asn Ser Leu Lys Gln Glu
260 265 270

Trp Ile Cys Asn Val Gly Ile Ser Met Gly Leu Thr Arg Ser Met Gln
275 280 285

Ile Val Pro Leu Asp Lys Gln Ile Thr Ile Ile Asp Ser Pro Cys Leu
290 295 300

Ile Ile Ser Pro Cys Asn Ser Pro Thr Ala Leu Ala Leu Arg Ser Pro
305 310 315 320

Ala Ser Ile Glu Glu Leu Arg Pro Leu Glu Ala Ala Ser Ala Ile Leu
325 330 335

Ser Gln Ala Asp Asn Glu Gln Val Val Leu Lys Tyr Thr Val Pro Glu
340 345 350

Tyr Lys Asp Ser Leu His Phe Phe Thr Lys Leu Ala Gln Arg Arg Gly
355 360 365

Leu His Gln Lys Gly Gly Ser Pro Asn Val Glu Ser Ala Ala Lys Leu
370 375 380

Val Trp Ser Glu Trp Thr Gly Ala Ser Leu Gly Tyr Tyr Cys His Pro
385 390 395 400

Pro Ala Ser Trp Asn His Ser Leu His Phe Asn Glu Asn Ile Ala Ala
405 410 415

Val Met Lys Lys Gly Phe Asn Leu Glu Glu Leu Glu Lys Asn Asn Ala
420 425 430

His Ser Ile Gln Val Leu Lys Gly Pro His Leu Thr Asn Arg Ile Leu
435 440 445

Phe Arg Ser Ser Gly Leu Thr Asn Gly Ile Leu Asp Glu Lys Asp Ile
450 455 460

Val Glu Glu Ser Pro Ser Gln Thr Glu Asp Gln Gln Asp Ala Asp Asp
465 470 475 480

Gln Glu Asn Gly Ser Gly Glu Arg Asn Ala Glu Ile Ser Asp Val Ala
485 490 495

Sequence Listing

Pro Val Glu Glu Thr Arg Glu Leu Ser Pro Glu Gln Ser Thr Ala Gly
500 505 510

Lys Pro Ser Asp Gly Ser Ser Ala Leu Asp Arg Ala Ser Gln Glu Asp
515 520 525

Glu Thr Tyr Asp Phe Thr Thr Asp Tyr Ile
530 535

<210> 5
<211> 27
<212> PRT
<213> Homo sapiens

<400> 5

Leu Arg Glu Ala Glu Leu Arg Lys Gln Arg Leu Glu Glu Leu Lys Gln
1 5 10 15

Gln Gln Lys Leu Asp Arg Gln Lys Glu Leu Glu
20 25

<210> 6
<211> 549
<212> PRT
<213> Homo sapiens

<400> 6

Met Lys Arg Pro Lys Leu Lys Lys Ala Ser Lys Arg Met Thr Cys His
1 5 10 15

Lys Arg Tyr Lys Ile Gln Lys Lys Val Arg Glu His His Arg Lys Leu
20 25 30

Arg Lys Glu Ala Lys Lys Gln Gly His Lys Lys Pro Arg Lys Asp Pro
35 40 45

Gly Val Pro Asn Ser Ala Pro Phe Lys Glu Ala Leu Leu Arg Glu Ala
50 55 60

Glu Leu Arg Lys Gln Arg Leu Glu Glu Leu Lys Gln Gln Gln Lys Leu
65 70 75 80

Asp Arg Gln Lys Glu Leu Glu Lys Lys Arg Lys Leu Glu Thr Asn Pro
85 90 95

Asp Ile Lys Pro Ser Asn Val Glu Pro Met Glu Lys Glu Phe Gly Leu
100 105 110

Cys Lys Thr Glu Asn Lys Ala Lys Ser Gly Lys Gln Asn Ser Lys Lys
Page 8

Sequence Listing

115

120

125

Leu Tyr Cys Gln Glu Leu Lys Lys Val Ile Glu Ala Ser Asp Val Val
130 135 140

Leu Glu Val Leu Asp Ala Arg Asp Pro Leu Gly Cys Arg Cys Pro Gln
145 150 155 160

Val Glu Glu Ala Ile Val Gln Ser Gly Gln Lys Lys Leu Val Leu Ile
165 170 175

Leu Asn Lys Ser Asp Leu Val Pro Lys Glu Asn Leu Glu Ser Trp Leu
180 185 190

Asn Tyr Leu Lys Lys Glu Leu Pro Thr Val Val Phe Arg Ala Ser Thr
195 200 205

Lys Pro Lys Asp Lys Gly Lys Ile Thr Lys Arg Val Lys Ala Lys Lys
210 215 220

Asn Ala Ala Pro Phe Arg Ser Glu Val Cys Phe Gly Lys Glu Gly Leu
225 230 235 240

Trp Lys Leu Leu Gly Gly Phe Gln Glu Thr Cys Ser Lys Ala Ile Arg
245 250 255

Val Gly Val Ile Gly Phe Pro Asn Val Gly Lys Ser Ser Ile Ile Asn
260 265 270

Ser Leu Lys Gln Glu Gln Met Cys Asn Val Gly Val Ser Met Gly Leu
275 280 285

Thr Arg Ser Met Gln Val Val Pro Leu Asp Lys Gln Ile Thr Ile Ile
290 295 300

Asp Ser Pro Ser Phe Ile Val Ser Pro Leu Asn Ser Ser Ser Ala Leu
305 310 315 320

Ala Leu Arg Ser Pro Ala Ser Ile Glu Val Val Lys Pro Met Glu Ala
325 330 335

Ala Ser Ala Ile Leu Ser Gln Ala Asp Ala Arg Gln Val Val Leu Lys
340 345 350

Tyr Thr Val Pro Gly Tyr Arg Asn Ser Leu Glu Phe Phe Thr Met Leu
355 360 365

Sequence Listing

Ala Gln Arg Arg Gly Met His Gln Lys Gly Gly Ile Pro Asn Val Glu
370 375 380

Gly Ala Ala Lys Leu Leu Trp Ser Glu Trp Thr Gly Ala Ser Leu Ala
385 390 395 400

Tyr Tyr Cys His Pro Pro Thr Ser Trp Thr Pro Pro Pro Tyr Phe Asn
405 410 415

Glu Ser Ile Val Val Asp Met Lys Ser Gly Phe Asn Leu Glu Glu Leu
420 425 430

Glu Lys Asn Asn Ala Gln Ser Ile Arg Ala Ile Lys Gly Pro His Leu
435 440 445

Ala Asn Ser Ile Leu Phe Gln Ser Ser Gly Leu Thr Asn Gly Ile Ile
450 455 460

Glu Glu Lys Asp Ile His Glu Glu Leu Pro Lys Arg Lys Glu Arg Lys
465 470 475 480

Gln Glu Glu Arg Glu Asp Asp Lys Asp Ser Asp Gln Glu Thr Val Asp
485 490 495

Glu Glu Val Asp Glu Asn Ser Ser Gly Met Phe Ala Ala Glu Glu Thr
500 505 510

Gly Glu Ala Leu Ser Glu Glu Thr Thr Ala Gly Glu Gln Ser Thr Arg
515 520 525

Ser Phe Ile Leu Asp Lys Ile Ile Glu Glu Asp Asp Ala Tyr Asp Phe
530 535 540

Ser Thr Asp Tyr Val
545

<210> 7
<211> 23
<212> RNA
<213> Artificial Sequence

<220>
<223> NS-specific siRNA

<220>
<221> misc_feature
<222> (22)..(23)
<223> n is t

<400> 7

Sequence Listing

23

aagaacuaaa acagcagcag ann

<210> 8
<211> 23
<212> RNA
<213> Artificial Sequence

<220>
<223> Control siRNA for rat cells

<220>
<221> misc_feature
<222> (22)..(23)
<223> n is t

<400> 8
aacauucaga cugggaaau gnn

23

<210> 9
<211> 23
<212> RNA
<213> Artificial Sequence

<220>
<223> Control siRNA for human cells

<220>
<221> misc_feature
<222> (22)..(23)
<223> n is t

<400> 9
aaucagacgu ggaccagaag ann

23

<210> 10
<211> 549
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of a consensus nucleostemin

<220>
<221> MISC_FEATURE
<222> (39)..(39)
<223> Xaa is Arg or Gln

<220>
<221> MISC_FEATURE
<222> (45)..(45)
<223> Xaa is Lys or Arg

<220>
<221> MISC_FEATURE
<222> (70)..(70)
<223> Xaa is Gln or Arg

Sequence Listing

```
<220>
<221> MISC_FEATURE
<222> (86)..(86)
<223> Xaa is Gln or Leu

<220>
<221> misc_feature
<222> (88)..(88)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (94)..(95)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (97)..(100)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (105)..(106)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (108)..(110)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> MISC_FEATURE
<222> (111)..(112)
<223> Xaa can be any naturally occurring amino acid or no amino acid

<220>
<221> misc_feature
<222> (113)..(117)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (121)..(121)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (126)..(126)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (130)..(130)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (143)..(143)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (161)..(161)
```

Sequence Listing

<223> Xaa can be any naturally occurring amino acid

<220>

<221> misc_feature

<222> (165)..(166)

<223> Xaa can be any naturally occurring amino acid

<220>

<221> misc_feature

<222> (170)..(170)

<223> Xaa can be any naturally occurring amino acid

<220>

<221> misc_feature

<222> (174)..(174)

<223> Xaa can be any naturally occurring amino acid

<220>

<221> misc_feature

<222> (176)..(176)

<223> Xaa can be any naturally occurring amino acid

<220>

<221> misc_feature

<222> (190)..(190)

<223> Xaa can be any naturally occurring amino acid

<220>

<221> misc_feature

<222> (193)..(193)

<223> Xaa can be any naturally occurring amino acid

<220>

<221> misc_feature

<222> (196)..(196)

<223> Xaa can be any naturally occurring amino acid

<220>

<221> misc_feature

<222> (205)..(205)

<223> Xaa can be any naturally occurring amino acid

<220>

<221> misc_feature

<222> (209)..(210)

<223> Xaa can be any naturally occurring amino acid

<220>

<221> MISC_FEATURE

<222> (212)..(212)

<223> Xaa can be any naturally occurring amino acid or no amino acid

<220>

<221> misc_feature

<222> (213)..(214)

<223> Xaa can be any naturally occurring amino acid

<220>

<221> MISC_FEATURE

<222> (216)..(216)

<223> Xaa can be any naturally occurring amino acid or no amino acid

<220>

Sequence Listing

<221> misc_feature
<222> (218)..(220)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (222)..(222)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> MISC_FEATURE
<222> (224)..(225)
<223> Xaa can be any naturally occurring amino acid or no amino acid

<220>
<221> misc_feature
<222> (226)..(227)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (230)..(230)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (232)..(233)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (235)..(235)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (239)..(239)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (246)..(246)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (249)..(250)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (252)..(252)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (254)..(256)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (260)..(260)
<223> Xaa can be any naturally occurring amino acid

Sequence Listing

```
<220>
<221> misc_feature
<222> (270)..(270)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (278)..(279)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (281)..(281)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (284)..(284)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (294)..(294)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (308)..(309)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (311)..(311)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (314)..(314)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (317)..(318)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (330)..(332)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (334)..(334)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (346)..(347)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
```

Sequence Listing

<222> (357)..(357)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (359)..(360)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (363)..(363)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (367)..(367)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (374)..(374)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (380)..(380)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (385)..(385)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (390)..(390)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (400)..(400)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (407)..(407)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (410)..(414)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (418)..(418)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (420)..(422)
<223> Xaa can be any naturally occurring amino acid

Sequence Listing

```
<220>
<221> misc_feature
<222> (425)..(425)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (438)..(438)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (441)..(443)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (449)..(449)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (451)..(451)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (455)..(455)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (464)..(465)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (470)..(470)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (473)..(473)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (475)..(477)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (479)..(480)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (482)..(483)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> MISC_FEATURE
<222> (484)..(489)
```

Sequence Listing

<223> Xaa can be any naturally occurring amino acid or no amino acid

<220>

<221> misc_feature

<222> (490)..(490)

<223> Xaa can be any naturally occurring amino acid

<220>

<221> misc_feature

<222> (494)..(497)

<223> Xaa can be any naturally occurring amino acid

<220>

<221> misc_feature

<222> (499)..(503)

<223> Xaa can be any naturally occurring amino acid

<220>

<221> misc_feature

<222> (505)..(509)

<223> Xaa can be any naturally occurring amino acid

<220>

<221> misc_feature

<222> (513)..(513)

<223> Xaa can be any naturally occurring amino acid

<220>

<221> misc_feature

<222> (515)..(520)

<223> Xaa can be any naturally occurring amino acid

<220>

<221> misc_feature

<222> (523)..(525)

<223> Xaa can be any naturally occurring amino acid

<220>

<221> misc_feature

<222> (527)..(528)

<223> Xaa can be any naturally occurring amino acid

<220>

<221> misc_feature

<222> (530)..(531)

<223> Xaa can be any naturally occurring amino acid

<220>

<221> misc_feature

<222> (534)..(537)

<223> Xaa can be any naturally occurring amino acid

<220>

<221> misc_feature

<222> (540)..(541)

<223> Xaa can be any naturally occurring amino acid

<220>

<221> misc_feature

<222> (545)..(545)

<223> Xaa can be any naturally occurring amino acid

<220>

Sequence Listing

<221> misc_feature

<222> (549)..(549)

<223> Xaa can be any naturally occurring amino acid

<400> 10

Met Lys Arg Pro Lys Leu Lys Lys Ala Ser Lys Arg Met Thr Cys His
1 5 10 15

Lys Arg Tyr Lys Ile Gln Lys Lys Val Arg Glu His His Arg Lys Leu
20 25 30

Arg Lys Glu Ala Lys Lys Xaa Gly His Lys Lys Pro Xaa Lys Asp Pro
35 40 45

Gly Val Pro Asn Ser Ala Pro Phe Lys Glu Ala Leu Leu Arg Glu Ala
50 55 60

Glu Leu Arg Lys Gln Xaa Leu Glu Glu Leu Lys Gln Gln Gln Lys Leu
65 70 75 80

Asp Arg Gln Lys Glu Xaa Glu Xaa Lys Arg Lys Leu Glu Xaa Xaa Pro
85 90 95

Xaa Xaa Xaa Xaa Ser Asn Val Glu Xaa Xaa Glu Xaa Xaa Xaa Xaa Xaa
100 105 110

Xaa Xaa Xaa Xaa Xaa Lys Ala Lys Xaa Gly Lys Gln Asn Xaa Lys Lys
115 120 125

Leu Xaa Cys Gln Glu Leu Lys Lys Val Ile Glu Ala Ser Asp Xaa Val
130 135 140

Leu Glu Val Leu Asp Ala Arg Asp Pro Leu Gly Cys Arg Cys Pro Gln
145 150 155 160

Xaa Glu Glu Ala Xaa Xaa Gln Ser Gly Xaa Lys Lys Leu Xaa Leu Xaa
165 170 175

Leu Asn Lys Ser Asp Leu Val Pro Lys Glu Asn Leu Glu Xaa Trp Leu
180 185 190

Xaa Tyr Leu Xaa Lys Glu Leu Pro Thr Val Val Phe Xaa Ala Ser Thr
195 200 205

Xaa Xaa Lys Xaa Xaa Xaa Lys Xaa Thr Xaa Xaa Xaa Lys Xaa Lys Xaa
210 215 220

Xaa Xaa Xaa Pro Phe Xaa Ser Xaa Xaa Cys Xaa Gly Lys Glu Xaa Leu
Page 19

225

230

Sequence Listing

235

240

Trp Lys Leu Leu Gly Xaa Phe Gln Xaa Xaa Cys Xaa Lys Xaa Xaa Xaa
245 250 255

Val Gly Val Xaa Gly Phe Pro Asn Val Gly Lys Ser Ser Xaa Ile Asn
260 265 270

Ser Leu Lys Gln Glu Xaa Xaa Cys Xaa Val Gly Xaa Ser Met Gly Leu
275 280 285

Thr Arg Ser Met Gln Xaa Val Pro Leu Asp Lys Gln Ile Thr Ile Ile
290 295 300

Asp Ser Pro Xaa Xaa Ile Xaa Ser Pro Xaa Asn Ser Xaa Xaa Ala Leu
305 310 315 320

Ala Leu Arg Ser Pro Ala Ser Ile Glu Xaa Xaa Xaa Pro Xaa Glu Ala
325 330 335

Ala Ser Ala Ile Leu Ser Gln Ala Asp. Xaa Xaa Gln Val Val Leu Lys
340 345 350

Tyr Thr Val Pro Xaa Tyr Xaa Xaa Ser Leu Xaa Phe Phe Thr Xaa Leu
355 360 365

Ala Gln Arg Arg Gly Xaa His Gln Lys Gly Gly Xaa Pro Asn Val Glu
370 375 380

Xaa Ala Ala Lys Leu Xaa Trp Ser Glu Trp Thr Gly Ala Ser Leu Xaa
385 390 395 400

Tyr Tyr Cys His Pro Pro Xaa Ser Trp Xaa Xaa Xaa Xaa Phe Asn
405 410 415

Glu Xaa Ile Xaa Xaa Xaa Met Lys Xaa Gly Phe Asn Leu Glu Glu Leu
420 425 430

Glu Lys Asn Asn Ala Xaa Ser Ile Xaa Xaa Xaa Lys Gly Pro His Leu
435 440 445

Xaa Asn Xaa Ile Leu Phe Xaa Ser Ser Gly Leu Thr Asn Gly Ile Xaa
450 455 460

Xaa Glu Lys Asp Ile Xaa Glu Glu Xaa Pro Xaa Xaa Glu Xaa Xaa
465 470 475 480

Sequence Listing

Gln Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Asp Gln Glu Xaa Xaa Xaa
 485 490 495

Xaa Glu Xaa Xaa Xaa Xaa Xaa Ser Xaa Xaa Xaa Xaa Xaa Glu Glu Thr
 500 505 510

Xaa Glu Xaa Xaa Xaa Xaa Xaa Xaa Thr Ala Xaa Xaa Xaa Ser Xaa Xaa
 515 520 525

Ser Xaa Xaa Leu Asp Xaa Xaa Xaa Glu Asp Xaa Xaa Tyr Asp Phe
 530 535 540

Xaa Thr Asp Tyr Xaa
 545

<210> 11
 <211> 1926
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> NS2

<220>
 <221> CDS
 <222> (122)..(1852)

<400> 11
 gctgcgcaact cctggactgg cgacgttgtg cttctaacag ctctccgagg tccctgccgg 60
 aagtgttagga agaaggcagac agatttgaac atctctgttt ccagcttctc tgatcatcat 120
 g atg aag att aga cac aaa aac aaa aaa cca ggt aaa ggt tcc aaa ggc 169
 Met Lys Ile Arg His Lys Asn Lys Lys Pro Gly Lys Gly Ser Lys Gly
 1 5 10 15

tgt aag aag cct gca agg caa aat ggg aag aaa gta acc tcc aga cca 217
 Cys Lys Lys Pro Ala Arg Gln Asn Gly Lys Lys Val Thr Ser Arg Pro
 20 25 30

tca tct gct ccc cag att gtt cat ggc aat gac cat gcc agt cgc gag 265
 Ser Ser Ala Pro Gln Ile Val His Gly Asn Asp His Ala Ser Arg Glu
 35 40 45

gcc gaa tta aag aag aaa agg gtc gag gag atg agg gag aag cag caa 313
 Ala Glu Leu Lys Lys Lys Arg Val Glu Glu Met Arg Glu Lys Gln Gln
 50 55 60

gtt gcc cgg gag caa gag aga cag aga cac agg acc atg gag agc tat 361
 Val Ala Arg Glu Gln Glu Arg Gln Arg His Arg Thr Met Glu Ser Tyr
 65 70 75 80

tgt cag gat gtc ctg aaa cgt cag cag gaa ttt gaa caa aag gag gaa 409
 Cys Gln Asp Val Leu Lys Arg Gln Gln Glu Phe Glu Gln Lys Glu Glu
 85 90 95

gtt ttg cag gaa tta aac atg ttt cct cag ttg gat gat gag gcc aca 457
 Page 21

Sequence Listing

Val	Leu	Gln	Glu	Leu	Asn	Met	Phe	Pro	Gln	Leu	Asp	Asp	Glu	Ala	Thr	
100								105					110			
agg	aag	gcc	tat	tac	aag	gaa	tcc	cgg	aag	gtg	gtt	gag	tac	tct	gat	505
Arg	Lys	Ala	Tyr	Tyr	Lys	Glu	Phe	Arg	Lys	Val	Val	Glu	Tyr	Ser	Asp	
115							120					125				
gtg	att	ctg	gaa	gtc	cta	gat	gcc	aga	gac	cca	ttt	ggc	tgc	cgc	tgt	553
Val	Ile	Leu	Glu	Val	Leu	Asp	Ala	Arg	Asp	Pro	Leu	Gly	Cys	Arg	Cys	
130							135					140				
tcc	cag	atg	gag	gag	act	gtc	ctt	cgt	gca	gaa	ggc	aac	aag	aag	ctg	601
Phe	Gln	Met	Glu	Glu	Thr	Val	Leu	Arg	Ala	Glu	Gly	Asn	Lys	Lys	Leu	
145							150					155				160
gtc	ttg	gtc	tta	aat	aag	ata	gat	ctc	gtt	ccc	aag	gag	att	gtg	gaa	649
Val	Leu	Val	Leu	Asn	Lys	Ile	Asp	Leu	Val	Pro	Lys	Glu	Ile	Val	Glu	
165							170						175			
aag	tgg	ctg	gaa	tac	ctt	ctc	aat	gaa	ctg	cca	act	gtg	gct	ttc	aag	697
Lys	Trp	Leu	Glu	Tyr	Leu	Leu	Asn	Glu	Leu	Pro	Thr	Val	Ala	Phe	Lys	
180							185						190			
gcc	agc	acc	cag	cat	cat	cag	gtc	aaa	aac	ttt	act	cgt	tgt	aaa	gtt	745
Ala	Ser	Thr	Gln	His	His	Gln	Val	Lys	Asn	Leu	Thr	Arg	Cys	Lys	Val	
195							200						205			
cca	gtg	gac	cag	gcc	tct	gag	tcg	ctt	ttt	aaa	agc	aga	gcc	tgc	ttt	793
Pro	Val	Asp	Gln	Ala	Ser	Glu	Ser	Leu	Leu	Lys	Ser	Arg	Ala	Cys	Phe	
210							215						220			
gga	gcc	gaa	aat	ctc	atg	agg	gtc	ctg	ggg	aac	tat	tgt	cgc	ctg	ggg	841
Gly	Ala	Glu	Asn	Leu	Met	Arg	Val	Leu	Gly	Asn	Tyr	Cys	Arg	Leu	Gly	
225							230						235			240
gaa	gtg	cgt	ggc	cac	att	cgt	gtg	ggt	gtt	gta	ggc	ctt	ccc	aat	gtg	889
Glu	Val	Arg	Gly	His	Ile	Arg	Val	Gly	Val	Val	Gly	Leu	Pro	Asn	Val	
245							250						255			
ggg	aag	agc	agt	ctg	atc	aat	agc	ctg	aag	cgc	agc	cgt	gct	tgt	agt	937
Gly	Lys	Ser	Ser	Leu	Ile	Asn	Ser	Leu	Lys	Arg	Ser	Arg	Ala	Cys	Ser	
260							265						270			
gtg	gga	gct	gtt	cct	ggt	gtc	aca	aaa	ttt	atg	cag	gag	gtc	tac	cta	985
Val	Gly	Ala	Val	Pro	Gly	Val	Thr	Lys	Phe	Met	Gln	Glu	Val	Tyr	Leu	
275							280						285			
gac	aag	ttt	atc	agg	ctt	ctg	gat	gca	cca	ggc	att	gtc	cca	gga	ccc	1033
Asp	Lys	Phe	Ile	Arg	Leu	Leu	Asp	Ala	Pro	Gly	Ile	Val	Pro	Gly	Pro	
290							295						300			
aat	tca	gag	gtg	ggc	acc	atc	ctg	cgt	aat	tgc	atc	cat	gtg	cag	aag	1081
Asn	Ser	Glu	Val	Gly	Thr	Ile	Leu	Arg	Asn	Cys	Ile	His	Val	Gln	Lys	
305							310						315			320
ctg	gca	gac	cct	gtg	acc	ccg	gtg	gag	acc	atc	ctt	cag	cgc	tgc	aac	1129
Leu	Ala	Asp	Pro	Val	Thr	Pro	Val	Glu	Thr	Ile	Leu	Gln	Arg	Cys	Asn	
325							330						335			
ctg	gag	gag	att	tcc	agc	tac	tat	ggt	gta	tct	gga	ttc	cag	acg	act	1177
Leu	Glu	Glu	Ile	Ser	Ser	Tyr	Tyr	Gly	Val	Ser	Gly	Phe	Gln	Thr	Thr	
340							345						350			

Sequence Listing

gag cac ttt ctg act gca gtg gcc cat cgc ttg gga aag aag aag aag Glu His Phe Leu Thr Ala Val Ala His Arg Leu Gly Lys Lys Lys Lys 355 360 365	1225
gga ggt gta tat agt cag gaa cag gct gcc aaa gct gtg ctg gct gac Gly Gly Val Tyr Ser Gln Glu Gln Ala Ala Lys Ala Val Leu Ala Asp 370 375 380	1273
tgg gtg agt ggg aag atc agc ttc tat aca cta cca ccg ccc act cac Trp Val Ser Gly Lys Ile Ser Phe Tyr Thr Leu Pro Pro Pro Thr His 385 390 395 400	1321
act ctg ccc acc cat ctc agt gct gag att gtt aag gag atg act gag Thr Leu Pro Thr His Leu Ser Ala Glu Ile Val Lys Glu Met Thr Glu 405 410 415	1369
gtc ttt gat ata gaa gat act gag cac gcc aat gaa gac acc atg gaa Val Phe Asp Ile Glu Asp Thr Glu His Ala Asn Glu Asp Thr Met Glu 420 425 430	1417
tgc tta gct gtg gga gaa tcc gat gag ctg ttg ggt gac atg gac cca Cys Leu Ala Val Gly Glu Ser Asp Glu Leu Leu Gly Asp Met Asp Pro 435 440 445	1465
caa gaa atg gag gtc agg tgg ctc cat tct cca ctg gtg aaa ata gca Gln Glu Met Glu Val Arg Trp Leu His Ser Pro Leu Val Lys Ile Ala 450 455 460	1513
gat gct att gaa aat aga agc acc gtg tat aag att gga aat ctc act Asp Ala Ile Glu Asn Arg Ser Thr Val Tyr Lys Ile Gly Asn Leu Thr 465 470 475 480	1561
ggg tat tgt acc aaa cca aac cgt aat cag atg ggg tgg cct aaa cgc Gly Tyr Cys Thr Lys Pro Asn Arg Asn Gln Met Gly Trp Pro Lys Arg 485 490 495	1609
aat gtg gac cac cat tgc ccc caa aat aac cgt gta gta gag gtc agt Asn Val Asp His His Cys Pro Gln Asn Asn Arg Val Val Glu Val Ser 500 505 510	1657
tct gtg gac cgc cgc ccg atg ttg cag agg atc ctg gag aca gac cca Ser Val Asp Arg Arg Pro Met Leu Gln Arg Ile Leu Glu Thr Asp Pro 515 520 525	1705
ctt cag caa ggc cag gct ctg gaa tct gcc ttg aag aat aag aaa aaa Leu Gln Gln Gly Gln Ala Leu Glu Ser Ala Leu Lys Asn Lys Lys Lys 530 535 540	1753
ttg cag aag cgt tca gat aaa atc gcc act aag ttg tct gac tcc atg Leu Gln Lys Arg Ser Asp Lys Ile Ala Thr Lys Leu Ser Asp Ser Met 545 550 555 560	1801
atg tcc atg ctt gac ctc tct ggc aac tcc gat gac tgt gca ggt gac Met Ser Met Leu Asp Leu Ser Gly Asn Ser Asp Asp Cys Ala Gly Asp 565 570 575	1849
tga gcagctgacc ttccccctca tactgcaagt actgcttccc gtgcgatggg	1902
agagtcagat gcctttcatt ctct	1926

Sequence Listing

<212> PRT
<213> Artificial Sequence

<220>
<223> NS2

<400> 12

Met Lys Ile Arg His Lys Asn Lys Lys Pro Gly Lys Gly Ser Lys Gly
1 5 10 15

Cys Lys Lys Pro Ala Arg Gln Asn Gly Lys Lys Val Thr Ser Arg Pro
20 25 30

Ser Ser Ala Pro Gln Ile Val His Gly Asn Asp His Ala Ser Arg Glu
35 40 45

Ala Glu Leu Lys Lys Lys Arg Val Glu Glu Met Arg Glu Lys Gln Gln
50 55 60

Val Ala Arg Glu Gln Glu Arg Gln Arg His Arg Thr Met Glu Ser Tyr
65 70 75 80

Cys Gln Asp Val Leu Lys Arg Gln Gln Glu Phe Glu Gln Lys Glu Glu
85 90 95

Val Leu Gln Glu Leu Asn Met Phe Pro Gln Leu Asp Asp Glu Ala Thr
100 105 110

Arg Lys Ala Tyr Tyr Lys Glu Phe Arg Lys Val Val Glu Tyr Ser Asp
115 120 125

Val Ile Leu Glu Val Leu Asp Ala Arg Asp Pro Leu Gly Cys Arg Cys
130 135 140

Phe Gln Met Glu Glu Thr Val Leu Arg Ala Glu Gly Asn Lys Lys Leu
145 150 155 160

Val Leu Val Leu Asn Lys Ile Asp Leu Val Pro Lys Glu Ile Val Glu
165 170 175

Lys Trp Leu Glu Tyr Leu Leu Asn Glu Leu Pro Thr Val Ala Phe Lys
180 185 190

Ala Ser Thr Gln His His Gln Val Lys Asn Leu Thr Arg Cys Lys Val
195 200 205

Pro Val Asp Gln Ala Ser Glu Ser Leu Leu Lys Ser Arg Ala Cys Phe
210 215 220

Sequence Listing

Gly Ala Glu Asn Leu Met Arg Val Leu Gly Asn Tyr Cys Arg Leu Gly
225 230 235 240

Glu Val Arg Gly His Ile Arg Val Gly Val Val Gly Leu Pro Asn Val
245 250 255

Gly Lys Ser Ser Leu Ile Asn Ser Leu Lys Arg Ser Arg Ala Cys Ser
260 265 270

Val Gly Ala Val Pro Gly Val Thr Lys Phe Met Gln Glu Val Tyr Leu
275 280 285

Asp Lys Phe Ile Arg Leu Leu Asp Ala Pro Gly Ile Val Pro Gly Pro
290 295 300

Asn Ser Glu Val Gly Thr Ile Leu Arg Asn Cys Ile His Val Gln Lys
305 310 315 320

Leu Ala Asp Pro Val Thr Pro Val Glu Thr Ile Leu Gln Arg Cys Asn
325 330 335

Leu Glu Glu Ile Ser Ser Tyr Tyr Gly Val Ser Gly Phe Gln Thr Thr
340 345 350

Glu His Phe Leu Thr Ala Val Ala His Arg Leu Gly Lys Lys Lys Lys
355 360 365

Gly Gly Val Tyr Ser Gln Glu Gln Ala Ala Lys Ala Val Leu Ala Asp
370 375 380

Trp Val Ser Gly Lys Ile Ser Phe Tyr Thr Leu Pro Pro Pro Thr His
385 390 395 400

Thr Leu Pro Thr His Leu Ser Ala Glu Ile Val Lys Glu Met Thr Glu
405 410 415

Val Phe Asp Ile Glu Asp Thr Glu His Ala Asn Glu Asp Thr Met Glu
420 425 430

Cys Leu Ala Val Gly Glu Ser Asp Glu Leu Leu Gly Asp Met Asp Pro
435 440 445

Gln Glu Met Glu Val Arg Trp Leu His Ser Pro Leu Val Lys Ile Ala
450 455 460

Asp Ala Ile Glu Asn Arg Ser Thr Val Tyr Lys Ile Gly Asn Leu Thr
465 470 475 480

Sequence Listing

Gly Tyr Cys Thr Lys Pro Asn Arg Asn Gln Met Gly Trp Pro Lys Arg
485 490 495

Asn Val Asp His His Cys Pro Gln Asn Asn Arg Val Val Glu Val Ser
500 505 510

Ser Val Asp Arg Arg Pro Met Leu Gln Arg Ile Leu Glu Thr Asp Pro
515 520 525

Leu Gln Gln Gly Gln Ala Leu Glu Ser Ala Leu Lys Asn Lys Lys Lys
530 535 540

Leu Gln Lys Arg Ser Asp Lys Ile Ala Thr Lys Leu Ser Asp Ser Met
545 550 555 560

Met Ser Met Leu Asp Leu Ser Gly Asn Ser Asp Asp Cys Ala Gly Asp
565 570 575

<210> 13

<211> 2359

<212> DNA

<213> Artificial Sequence

<220>

<223> NS3

<220>

<221> CDS

<222> (111)..(2297)

<400> 13

gtcgacccac gcgtccgcca acgtgcttca cacaggacgc tttcccgct gggaaagtcgt 60

gaagtggttt acctcgcgag tagcagagcg gtgtcggtac tgtcgtcagg atg gtg 116
Met Val
1

aag ccc aag tac aaa gga cgg agc acc atc aac cgc tcg gcg gcc agc 164
Lys Pro Lys Tyr Lys Gly Arg Ser Thr Ile Asn Arg Ser Ala Ala Ser
5 10 15

acc aac cca gat cga gta cag gga gct ggc ggc caa aac atg agg gat 212
Thr Asn Pro Asp Arg Val Gln Gly Ala Gly Gln Asn Met Arg Asp
20 25 30

cgg ggc aca att cgg cgc ctg aat atg tac agg caa aag gag cgc agg 260
Arg Gly Thr Ile Arg Arg Leu Asn Met Tyr Arg Gln Lys Glu Arg Arg
35 40 45 50

aac agt cgt ggt aaa gtg att aag cca ctg cag tat cag tca act gtg 308
Asn Ser Arg Gly Lys Val Ile Lys Pro Leu Gln Tyr Gln Ser Thr Val
55 60 65

gct tct ggc aca gtg gcc cga gtg gag ccg aat att aaa tgg ttt gga 356
Page 26

Sequence Listing

Ala Ser Gly Thr Val Ala Arg Val Glu Pro Asn Ile Lys Trp Phe Gly	70 75 80
---	--

aat act cgt gtg atc aag cag gca tca tta caa aaa ttt caa gag gaa Asn Thr Arg Val Ile Lys Gln Ala Ser Leu Gln Lys Phe Gln Glu Glu	85 90 95	404
atg gat aaa gtt atg aag gat cca tac aaa gtt gtc atg aaa caa agc Met Asp Lys Val Met Lys Asp Pro Tyr Lys Val Val Met Lys Gln Ser	100 105 110	452
aaa tta ccg atg tct ctt ctg cac gat cga atc cag cct cat aac gca Lys Leu Pro Met Ser Leu Leu His Asp Arg Ile Gln Pro His Asn Ala	115 120 125	500
aaa gtc cac att ctt gat act gaa agc ttt gaa agt aca ttt ggc cca Lys Val His Ile Leu Asp Thr Glu Ser Phe Glu Ser Thr Phe Gly Pro	135 140 145	548
aag tca cag aga aag cgg cca aac ttg ttt gca agt gat atg caa tcc Lys Ser Gln Arg Lys Arg Pro Asn Leu Phe Ala Ser Asp Met Gln Ser	150 155 160	596
ctt cta gaa aac gct gaa atg tct act gag agc tat gac cag ggc aag Leu Leu Glu Asn Ala Glu Met Ser Thr Glu Ser Tyr Asp Gln Gly Lys	165 170 175	644
gac cgt gat ttg gtg atg gag gac act ggt gta aga aat gaa gct caa Asp Arg Asp Leu Val Met Glu Asp Thr Gly Val Arg Asn Glu Ala Gln	180 185 190	692
gaa gag ata tat aaa aaa ggg cag tca aaa aga ata tgg gga gaa ctc Glu Glu Ile Tyr Lys Lys Gly Gln Ser Lys Arg Ile Trp Gly Glu Leu	195 200 205	740
tac aag gtg ata gac tca tca gat gtt gtc gtt caa gtc ctt gac gct Tyr Lys Val Ile Asp Ser Ser Asp Val Val Val Gln Val Leu Asp Ala	215 220 225	788
aga gat ccg atg ggc act cgt tcc ccc cac atc gaa gct tac ttg aaa Arg Asp Pro Met Gly Thr Arg Ser Pro His Ile Glu Ala Tyr Leu Lys	230 235 240	836
aag gaa aaa ccc tgg aaa cat ctc att ttt gta ctc aat aag tgt gac Lys Glu Lys Pro Trp Lys His Leu Ile Phe Val Leu Asn Lys Cys Asp	245 250 255	884
ctt gtt cca act tgg gca acc aaa cga tgg gtt gct gtg ctc tcc cag Leu Val Pro Thr Trp Ala Thr Lys Arg Trp Val Ala Val Leu Ser Gln	260 265 270	932
gac tac cca aca ctg gct ttc cat gcg agc ctc acc aat ccc ttt ggg Asp Tyr Pro Thr Leu Ala Phe His Ala Ser Leu Thr Asn Pro Phe Gly	275 280 285	980
aag gga gca ttc att cag ctt ctg cgg cag ttt ggg aag ttg cac aca Lys Gly Ala Phe Ile Gln Leu Leu Arg Gln Phe Gly Lys Leu His Thr	295 300 305	1028
gac aag aaa caa atc agt gtt ggg ttc att ggc tat cca aat gta ggc Asp Lys Lys Gln Ile Ser Val Gly Phe Ile Gly Tyr Pro Asn Val Gly	310 315 320	1076

Sequence Listing

aag	agc	tct	gtg	att	aat	aca	tta	cga	tcc	aag	aaa	gtt	tgc	aac	gtg		1124
Lys	Ser	Ser	Val	Ile	Asn	Thr	Leu	Arg	Ser	Lys	Lys	Val	Cys	Asn	Val		
325							330					335					
gcc	ccc	att	gct	gga	gaa	aca	aag	gtc	tgg	cag	tat	att	acc	ttg	atg		1172
Ala	Pro	Ile	Ala	Gly	Glu	Thr	Lys	Val	Trp	Gln	Tyr	Ile	Thr	Leu	Met		
340						345					350						
cgt	cgt	ata	ttc	ctg	att	gac	tgc	cct	ggt	gtg	gtt	tac	cca	tct	gag		1220
Arg	Arg	Ile	Phe	Leu	Ile	Asp	Cys	Pro	Gly	Val	Val	Tyr	Pro	Ser	Glu		
355						360					365				370		
gac	tca	gag	acc	gac	att	gtg	ctc	aaa	gga	gtg	gtt	caa	gtt	gag	aaa		1268
Asp	Ser	Glu	Thr	Asp	Ile	Val	Leu	Lys	Gly	Val	Val	Gln	Val	Glu	Lys		
375							380					385					
att	aaa	gct	cct	caa	gac	cac	att	ggt	gct	gtc	ctt	gaa	cga	gca	aag		1316
Ile	Lys	Ala	Pro	Gln	Asp	His	Ile	Gly	Ala	Val	Leu	Glu	Arg	Ala	Lys		
390							395					400					
cca	gag	tat	atc	agc	aag	acg	tac	aag	att	gag	tcc	tgg	gag	aac	gcg		1364
Pro	Glu	Tyr	Ile	Ser	Lys	Thr	Tyr	Lys	Ile	Glu	Ser	Trp	Glu	Asn	Ala		
405							410					415					
gag	gac	ttt	ctt	gag	aag	cta	gct	ctc	cgc	act	ggg	aag	tta	ctg	aag		1412
Glu	Asp	Phe	Leu	Glu	Lys	Leu	Ala	Leu	Arg	Thr	Gly	Lys	Leu	Leu	Lys		
420							425					430					
ggt	gga	gag	cct	gac	atg	ctg	act	gtg	agc	aag	atg	gtt	ctc	aat	gac		1460
Gly	Gly	Glu	Pro	Asp	Met	Leu	Thr	Val	Ser	Lys	Met	Val	Leu	Asn	Asp		
435							440					445				450	
tgg	cag	aga	ggc	cga	atc	cct	ttc	ttt	gtc	aag	ccg	ccc	aat	gca	gag		1508
Trp	Gln	Arg	Gly	Arg	Ile	Pro	Phe	Phe	Val	Lys	Pro	Pro	Ash	Ala	Glu		
							455					460				465	
cta	ccg	acc	gat	tcc	cag	ctt	cca	cca	tcc	tca	cca	ttg	gaa	gtt	ccc		1556
Leu	Pro	Thr	Asp	Ser	Gln	Leu	Pro	Pro	Ser	Ser	Pro	Leu	Glu	Val	Pro		
							470					475				480	
aca	gaa	aca	acc	cag	aac	aac	cca	gaa	gaa	gag	acc	aca	gaa	aca	gaa		1604
Thr	Glu	Thr	Thr	Gln	Asn	Asn	Pro	Glu	Glu	Glu	Thr	Thr	Glu	Thr	Glu		
							485					490				495	
gtt	gaa	agg	tca	gac	tct	atc	act	gaa	aag	gag	cca	gaa	gga	gac	tgt		1652
Val	Glu	Arg	Ser	Asp	Ser	Ile	Thr	Glu	Lys	Glu	Pro	Glu	Gly	Asp	Cys		
							500					505				510	
tct	cag	gat	aga	aac	tca	gag	atg	caa	cag	atc	ctc	gca	cga	gtt	cgc		1700
Ser	Gln	Asp	Arg	Asn	Ser	Glu	Met	Gln	Gln	Ile	Leu	Ala	Arg	Val	Arg		
							515					520				530	
cag	aac	ttt	ggc	aaa	atc	aac	gtg	ggg	cct	cag	ttt	tct	gcg	gat	gac		1748
Gln	Asn	Phe	Gly	Lys	Ile	Asn	Val	Gly	Pro	Gln	Phe	Ser	Ala	Asp	Asp		
							535					540				545	
ctg	gtg	cct	gtg	gag	atg	tca	gac	ttg	gaa	gat	ctg	gaa	agc	tct	ggg		1796
Leu	Val	Pro	Val	Glu	Met	Ser	Asp	Leu	Glu	Asp	Leu	Glu	Ser	Ser	Gly		
							550					555				560	
gaa	gag	gaa	gaa	cag	gag	cag	gaa	cag	cca	ggg	gag	gat	gcc	gag	gaa		1844
Glu	Glu	Glu	Glu	Gln	Glu	Gln	Glu	Gln	Pro	Gly	Glu	Asp	Ala	Glu	Glu		
							565					570				575	

Sequence Listing

gag cgc tcc cca gac act cag gag gaa cca gtg gga aac gac acc aag Glu Arg Ser Pro Asp Thr Gln Glu Glu Pro Val Gly Asn Asp Thr Lys 580 585 590	1892
gcc gtg ctc aga gcc ctg gat gag aag att gcc aag tac cag agg ttt Ala Val Leu Arg Ala Leu Asp Glu Lys Ile Ala Lys Tyr Gln Arg Phe 595 600 605 610	1940
cta aat aaa gct aaa gct aaa aag ttc tct gcc gtc aga ata tcc aag Leu Asn Lys Ala Lys Ala Lys Phe Ser Ala Val Arg Ile Ser Lys 615 620 625	1988
gac tta agt gaa aag gtt ttt gca aaa tac aaa gaa gag aag aaa aca Asp Leu Ser Glu Lys Val Phe Ala Lys Tyr Lys Glu Glu Lys Lys Thr 630 635 640	2036
tct gca gaa gac agt gat gca gca ccc acc aaa aag gca agg aag tgg Ser Ala Glu Asp Ser Asp Ala Ala Pro Thr Lys Lys Ala Arg Lys Trp 645 650 655	2084
gat gca cag atg gaa gaa gaa cct tca aat aag act cag agg atg ctg Asp Ala Gln Met Glu Glu Pro Ser Asn Lys Thr Gln Arg Met Leu 660 665 670	2132
acg tgt aag gaa cgg agg aga gca gca cgg cag caa caa tcc aaa aaa Thr Cys Lys Glu Arg Arg Ala Ala Arg Gln Gln Gln Ser Lys Lys 675 680 685 690	2180
gtt ggt gtg cgt tac tac gag aca cac aat gtg aaa aac agg aac agg Val Gly Val Arg Tyr Tyr Glu Thr His Asn Val Lys Asn Arg Asn Arg 695 700 705	2228
aac aaa aag aag acg agc gac tca gag gga cag aaa cac aga cgc aac Asn Lys Lys Lys Thr Ser Asp Ser Glu Gly Gln Lys His Arg Arg Asn 710 715 720	2276
aag ttc aga cag aag cag taa ctgcgagaaa gctgtttatt aaattataca Lys Phe Arg Gln Lys Gln 725	2327
aaaataaaaa aaaaaaaaaa aaggcgccc gc	2359

<210> 14
<211> 728
<212> PRT
<213> Artificial Sequence

<220>
<223> NS3
<400> 14

Met Val Lys Pro Lys Tyr Lys Gly Arg Ser Thr Ile Asn Arg Ser Ala
1 5 10 15

Ala Ser Thr Asn Pro Asp Arg Val Gln Gly Ala Gly Gly Gln Asn Met
20 25 30

Arg Asp Arg Gly Thr Ile Arg Arg Leu Asn Met Tyr Arg Gln Lys Glu
Page 29

Sequence Listing

35

40

45

Arg Arg Asn Ser Arg Gly Lys Val Ile Lys Pro Leu Gln Tyr Gln Ser
 50 55 60

Thr Val Ala Ser Gly Thr Val Ala Arg Val Glu Pro Asn Ile Lys Trp
 65 70 75 80

Phe Gly Asn Thr Arg Val Ile Lys Gln Ala Ser Leu Gln Lys Phe Gln
 85 90 95

Glu Glu Met Asp Lys Val Met Lys Asp Pro Tyr Lys Val Val Met Lys
 100 105 110

Gln Ser Lys Leu Pro Met Ser Leu Leu His Asp Arg Ile Gln Pro His
 115 120 125

Asn Ala Lys Val His Ile Leu Asp Thr Glu Ser Phe Glu Ser Thr Phe
 130 135 140

Gly Pro Lys Ser Gln Arg Lys Arg Pro Asn Leu Phe Ala Ser Asp Met
 145 150 155 160

Gln Ser Leu Leu Glu Asn Ala Glu Met Ser Thr Glu Ser Tyr Asp Gln
 165 170 175

Gly Lys Asp Arg Asp Leu Val Met Glu Asp Thr Gly Val Arg Asn Glu
 180 185 190

Ala Gln Glu Glu Ile Tyr Lys Lys Gly Gln Ser Lys Arg Ile Trp Gly
 195 200 205

Glu Leu Tyr Lys Val Ile Asp Ser Ser Asp Val Val Val Gln Val Leu
 210 215 220

Asp Ala Arg Asp Pro Met Gly Thr Arg Ser Pro His Ile Glu Ala Tyr
 225 230 235 240

Leu Lys Lys Glu Lys Pro Trp Lys His Leu Ile Phe Val Leu Asn Lys
 245 250 255

Cys Asp Leu Val Pro Thr Trp Ala Thr Lys Arg Trp Val Ala Val Leu
 260 265 270

Ser Gln Asp Tyr Pro Thr Leu Ala Phe His Ala Ser Leu Thr Asn Pro
 275 280 285

Sequence Listing

Phe Gly Lys Gly Ala Phe Ile Gln Leu Leu Arg Gln Phe Gly Lys Leu
290 295 300

His Thr Asp Lys Lys Gln Ile Ser Val Gly Phe Ile Gly Tyr Pro Asn
305 310 315 320

Val Gly Lys Ser Ser Val Ile Asn Thr Leu Arg Ser Lys Lys Val Cys
325 330 335

Asn Val Ala Pro Ile Ala Gly Glu Thr Lys Val Trp Gln Tyr Ile Thr
340 345 350

Leu Met Arg Arg Ile Phe Leu Ile Asp Cys Pro Gly Val Val Tyr Pro
355 360 365

Ser Glu Asp Ser Glu Thr Asp Ile Val Leu Lys Gly Val Val Gln Val
370 375 380

Glu Lys Ile Lys Ala Pro Gln Asp His Ile Gly Ala Val Leu Glu Arg
385 390 395 400

Ala Lys Pro Glu Tyr Ile Ser Lys Thr Tyr Lys Ile Glu Ser Trp Glu
405 410 415

Asn Ala Glu Asp Phe Leu Glu Lys Leu Ala Leu Arg Thr Gly Lys Leu
420 425 430

Leu Lys Gly Gly Glu Pro Asp Met Leu Thr Val Ser Lys Met Val Leu
435 440 445

Asn Asp Trp Gln Arg Gly Arg Ile Pro Phe Phe Val Lys Pro Pro Asn
450 455 460

Ala Glu Leu Pro Thr Asp Ser Gln Leu Pro Pro Ser Ser Pro Leu Glu
465 470 475 480

Val Pro Thr Glu Thr Thr Gln Asn Asn Pro Glu Glu Glu Thr Thr Glu
485 490 495

Thr Glu Val Glu Arg Ser Asp Ser Ile Thr Glu Lys Glu Pro Glu Gly
500 505 510

Asp Cys Ser Gln Asp Arg Asn Ser Glu Met Gln Gln Ile Leu Ala Arg
515 520 525

Val Arg Gln Asn Phe Gly Lys Ile Asn Val Gly Pro Gln Phe Ser Ala
530 535 540

Sequence Listing

Asp Asp Leu Val Pro Val Glu Met Ser Asp Leu Glu Asp Leu Glu Ser
545 550 555 560

Ser Gly Glu Glu Glu Glu Gln Glu Gln Glu Gln Pro Gly Glu Asp Ala
565 570 575

Glu Glu Glu Arg Ser Pro Asp Thr Gln Glu Glu Pro Val Gly Asn Asp
580 585 590

Thr Lys Ala Val Leu Arg Ala Leu Asp Glu Lys Ile Ala Lys Tyr Gln
595 600 605

Arg Phe Leu Asn Lys Ala Lys Ala Lys Phe Ser Ala Val Arg Ile
610 615 620

Ser Lys Asp Leu Ser Glu Lys Val Phe Ala Lys Tyr Lys Glu Glu Lys
625 630 635 640

Lys Thr Ser Ala Glu Asp Ser Asp Ala Ala Pro Thr Lys Lys Ala Arg
645 650 655

Lys Trp Asp Ala Gln Met Glu Glu Glu Pro Ser Asn Lys Thr Gln Arg
660 665 670

Met Leu Thr Cys Lys Glu Arg Arg Ala Ala Arg Gln Gln Gln Ser
675 680 685

Lys Lys Val Gly Val Arg Tyr Tyr Glu Thr His Asn Val Lys Asn Arg
690 695 700

Asn Arg Asn Lys Lys Lys Thr Ser Asp Ser Glu Gly Gln Lys His Arg
705 710 715 720

Arg Asn Lys Phe Arg Gln Lys Gln
725